

CLAIMS

1. Robot for gripping and handling one or more objects, which robot comprises:

5 - a stationary base with a first guide extending in a first direction,

- an arm comprising a second guide extending in a second direction at an angle relative to the first direction, preferably perpendicularly to the first direction, which arm is 10 connected to the base by way of the first guide in such a way that the arm is movable in the first direction,

- a slide which is arranged on the second guide and is movable in the second direction,

15 - a gripper supported by the slide, for gripping one or more objects, which gripper is movable in a third direction intersecting the plane of the first and second directions, preferably perpendicularly,

20 - a number of actuators provided in a stationary position on the base, for driving the arm, the slide and the gripper by means of pulling elements, for example drive belts, which are connected to the arm, the slide and the gripper respectively, characterized in that the gripper is situated in an imaginary plane extending in the second and third directions and intersecting the central longitudinal axis of the arm.

25 2. Robot according to claim 1, characterized in that the slide can be mounted in the arm so that it can be turned around through 180° about an axis in the third direction, in such a way that after the reversal of the slide the gripper is still situated in the imaginary plane extending in the second and 30 third directions and intersecting the central longitudinal axis of the arm.

35 3. Robot according to claim 1 or 2, characterized in that the slide has a number of pulleys for guiding drive belts, which pulleys are provided on one side relative to the imaginary plane extending in the second and third directions and intersecting the central longitudinal axis of the arm, and which pulleys can

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be mounted in mirror image relative to the abovementioned imaginary plane.

4. Robot according to one of the preceding claims, characterized in that the gripper has a coinciding axis of 5 translation and axis of rotation in the third direction.

5. Robot according to one of the preceding claims, characterized in that a first bush and a second bush are provided on the slide, which bushes are drivable by means of a pulling element, and in that the shaft member comprises a round 10 shaft member projecting through the two bushes, the shaft member being provided on the periphery with cams placed in a spiral shape, the first bush being provided with a spiral-shaped groove which can interact with the cams on the shaft member in such a way that a rotation of the first bush results in a translation 15 of the shaft member, and the second bush being provided with a straight axial groove which can interact with the cams in such a way that a rotation of the second bush results in a rotation of the shaft member.

6. Robot according to claim 5, characterized in that the first 20 and second bushes are each drivable by means of a separate pulling element.

7. Robot according to claim 5 or 6, characterized in that the shaft member is removable.

8. Robot according to one of the preceding claims, 25 characterized in that the robot comprises a housing which surrounds a space in which the guides, the slide, the actuators and the pulling elements are accommodated, the base comprising a first housing part and the arm comprising a second housing part.

9. Robot according to claim 8, characterized in that the first 30 and second housing parts are made of plastic and/or stainless steel sheets.

10. Robot according to claim 8 or 9, characterized in that the housing and the parts inside it are designed in such a way that they can be cleaned.

35 11. Robot according to one of the preceding claims, characterized in that the actuators, viewed in the first direction, are distributed on the base.

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12. Robot according to one of the preceding claims, characterized in that actuators for driving the gripper are fitted in such a way that the pulling elements are of equal length.

5 13. Robot according to one of the preceding claims, characterized in that the actuators are identical.

14. Robot according to one of the preceding claims, characterized in that the actuators are provided at the same height.

10 15. Robot according to one of the preceding claims, characterized in that one or more of the pulling elements and actuators are connected by means of a transmission formed by a shaft with two pulleys, the pulling element in each case acting upon the one pulley, and the actuator acting, for example by way 15 of a transmission pulling element, on the shaft.

16. Robot according to one of the preceding claims, characterized in that one or more of the pulling elements and actuators is/are connected by means of a transmission formed by at least one shaft with a pulley which acts upon the pulling 20 element, guide pulleys being further provided for guiding the pulling element along the pulley.

17. Robot according to claim 16, characterized in that the guide pulleys are arranged movably in such a way and are connected to a spring element in such a way that through the 25 spring action the pulling element is tensioned by the pulleys in every operating state.

18. Robot according to one of the preceding claims, characterized in that the base is provided on a mobile frame.

19. Robot for gripping and handling one or more objects, which 30 robot comprises:

- a stationary base with a first guide extending in a first direction,

- an arm comprising a second guide extending in a second direction, at an angle relative to the first direction, 35 preferably perpendicularly to the first direction, which arm is connected to the base by way of the first guide in such a way that the arm is movable in the first direction,

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- a slide which is arranged on the second guide and is movable in the second direction,

- a gripper supported by the slide, for gripping one or more objects, which gripper is movable in a third direction 5 intersecting the plane of the first and second directions, preferably perpendicularly,

- a number of actuators provided in a stationary position on the base, for driving the arm, the slide and the gripper by means of pulling elements, for example drive belts, which are 10 connected to the arm, the slide and the gripper respectively, characterized in that the actuators, viewed in the first direction, are distributed on the base.

20. Robot for gripping and handling one or more objects, which robot comprises:

15 - a stationary base with a first guide extending in a first direction,

- an arm comprising a second guide extending in a second direction at an angle relative to the first direction, preferably perpendicularly to the first direction, which arm is 20 connected to the base by way of the first guide in such a way that the arm is movable in the first direction,

- a slide which is arranged on the second guide and is movable in the second direction,

- a gripper supported by the slide, for gripping one or 25 more objects, which gripper is movable in a third direction intersecting the plane of the first and second directions, preferably perpendicularly,

- a number of actuators provided in a stationary position on the base, for driving the arm, the slide and the gripper by 30 means of pulling elements, for example drive belts, which are connected to the arm, the slide and the gripper respectively, characterized in that the robot is provided with a housing comprising a first housing part which surrounds the base and a second housing part which surrounds the arm.

35 21. Robot according to claim 20, characterized in that the first and second housing parts are made of plastic and/or stainless steel sheets.

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22. Robot according to claim 20 or 21, characterized in that the housing and the parts inside it are designed in such a way that they can be cleaned.

23. Robot for gripping and handling one or more objects, which 5 robot comprises:

- a stationary base with a first guide extending in a first direction,

- an arm comprising a second guide extending in a second direction at an angle relative to the first direction, 10 preferably perpendicularly to the first direction, which arm is connected to the base by way of the first guide in such a way that the arm is movable in the first direction,

- a slide which is arranged on the second guide and is movable in the second direction,

- 15 a gripper supported by the slide, for gripping one or more objects, which gripper is movable in a third direction intersecting the plane of the first and second directions, preferably perpendicularly,

- 20 a number of actuators provided in a stationary position on the base, for driving the arm, the slide and the gripper by means of pulling elements, for example drive belts, which are connected to the arm, the slide and the gripper respectively, characterized in that a first bush and a second bush are provided on the slide, which bushes are drivable by means of a pulling element, and in that the gripper comprises a round shaft member projecting through both bushes, the shaft member being provided on the periphery with cams placed in a spiral shape, the first bush being provided with a spiral-shaped groove which can interact with the cams on the shaft member in such a way 25 that a rotation of the first bush results in a translation of the shaft member, and the second bush being provided with a straight axial groove which can interact with the cams in such a way that a rotation of the second bush results in a rotation of the shaft member.

30 35 24. Robot according to claim 22, characterized in that the first and second bushes are each drivable by means of a separate pulling element.

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25. Robot according to claim 23 or 24, characterized in that the shaft member is removable.
26. Conveyor system comprising a conveyor and a robot according to one of the preceding claims, in which the robot is designed
5 to pick up one or more objects from a conveyor and to place the object(s) at a location next to the conveyor.
27. Conveyor system according to claim 26, which conveyor system comprises one or more conveyors disposed one behind the other and each comprising one or more robots disposed alongside
10 the conveyor, the conveyor disposed furthest downstream being adapted to move at a lower speed of conveyance than the conveyors disposed more upstream.
28. Conveyor system according to claim 26 or 27, in which the robot is connected to control means for controlling the robot,
15 the control means comprising a speed sensor for measuring the speed of the conveyor.
29. Conveyor system according to claim 28, in which the control means are provided with optical detection means for detecting the position of the objects on the conveyor.
- 20 30. Method for packaging foods, in which use is made of a conveyor system according to one of claims 26 - 29.